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August 9, 2001

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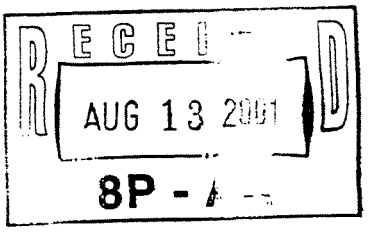

Richard R. Long, Director
Air and Radiation Program
U.S. EPA, Region 8
999 18th Street – Suite 300
Denver, CO 80202-2466

Dear Dick,

We received your letter dated June 25, 2001, which expresses EPA's comments on our air quality modeling protocol. We had submitted our protocol to you April 2, 2001, pursuant to our letter dated March 13, 2001. The attached discussion contains some thoughts that we have shared during our meetings and telephone conference calls since January 2001.

We agree with your statement that under current state and federal rules, "increment consumption calculations should generally be based on source activity for the two years immediately preceding the date for which increment consumption is being calculated, provided that the two year period is representative of "normal" source operation." We believe the crux of the issue is whether the 1999 and 2000 years are representative of normal operations. The definition of "representative actual annual emissions" includes . . . "Consider all relevant information . . . and compliance plans under title IV of the federal Clean Air Act." Title IV of the Clean Air Act requirements became effective in North Dakota in January 2000 and required reductions in SO_2 or purchase of SO_2 credits. This date is a clear time line in the historical progression of the Clean Air Act's control of source emissions. Most companies in ND opted to reduce SO_2 emissions and while we agree there is no guarantee these reductions will continue, we believe we must consider the changes in operation due to the Title IV requirements.

EPA has suggested the use of the 90th percentile of actual emissions rather than the allowable emissions as a possible alternative to using actual emission data. We would like to know where this methodology was previously used and the conditions associated with its use. Our assessment indicates the year 2000 actual hourly emissions among the power plants are poorly correlated as demonstrated by the attached table. Sums of actual concurrent hourly sulfur dioxide emissions exceed the sum of the 90th percentile of each respective source's emissions less than 0.3% of the year. Such sums exceed the sum of the 80th percentile only 2.4% of the year. This seems to indicate using the 90th percentile value would result in an over estimate of total emissions in all but those few hours and an overestimate of impacts in Class I areas. We intend to conduct modeling using this scenario for comparison purposes and for further discussion.

In a letter dated June 1, 1999, EPA acknowledges "The most accurate way to characterize the increment expansion (or consumption) from a source . . . would be to use continuous in-stack emission monitoring data . . . in the dispersion modeling effort. These hourly data would be paired with meteorological data taken at the same time and used in the modeling. This method would take into account the effect of both emissions and meteorological variability." The June 25, 2001 letter indicates that "CEM data has only become available since the mid-1990's, and a national policy on its possible use in calculating increment consumption has not been established. As we have discussed with Region 8 and EPA headquarters, we believe it is more appropriate to use the current data from CEMS and are very interested in developing a reasonable methodology to accomplish that. We fail to see the rationale for your position of allowing paired data analysis for intermittent sources but not for continuously operating sources at many locations with variable emission rates as we have in North Dakota.

We do wish to continue working cooperatively to resolve these issues. We also believe that some of these decisions are our State's right under the Clean Air Act on how to manage increment. We are proceeding with acquisition and formatting of year 2000 emissions data, meteorological data and other model inputs so as to complete our modeling protocol as submitted. We also plan to complete the documentation of the protocol to describe input emissions data, other input data and chosen model options.

Sincerely,

Francis J. Schwindt, Chief
Environmental Health Section

FJS:cc
Attach.
cc: Robert Harms
Jack McGraw

Year 2000 CEMS Sulfur Dioxide Correlation Statistics

Correlation Coefficients of Paired Hourly Data

	Avs #1	Avs #2	Ccrk #1	Ccrk #2	Cyote	Hskt #2	Lolds #1	Lolds #2	Mry #1	Mry #2	GreStn #1E	GreStn #10
Avs #1	1.000											
Avs #2	-0.241	1.000										
Ccrk #1	0.060	0.058	1.000									
Ccrk #2	0.045	0.134	0.190	1.000								
Cyote	-0.050	0.096	0.027	0.034	1.000							
Hskt #2	0.044	-0.061	-0.065	0.062	-0.270	1.000						
Lolds #1	0.011	0.058	0.043	0.071	-0.018	0.178	1.000					
Lolds #2	-0.009	-0.081	0.005	-0.113	-0.092	0.267	0.096	1.000				
Mry #1	0.062	-0.056	0.151	-0.077	-0.108	-0.032	-0.054	0.175	1.000			
Mry #2	-0.015	-0.050	0.038	-0.117	0.017	-0.008	-0.005	-0.107	0.010	1.000		
GreStn #1e	0.166	-0.014	0.109	0.089	-0.245	0.118	0.086	0.265	0.348	-0.025	1.000	
GreStn #10	0.142	-0.066	0.058	0.090	-0.176	0.073	-0.012	0.203	0.291	-0.059	0.680	1.000

Corresponding CEMS Emission Rates for Hour of 90th Percentile (by row, pounds per hour)

	Hour	Avs #1	Avs #2	Ccrk #1	Ccrk #2	Cyote	Hskt #2	Lolds #1	Lolds #2	Mry #1	Mry #2	GreStn #1E	GreStn #10	Total *
Avs #1	7432	1,865.1	1,553.7	6,021.6	3,378.7	4814.1	764.4	4,027.1	8,322.2	5,480.5	4,468.5	1453.6	340.9	42,490.4
Avs #2	3258	1,170.3	1,686.4	3,162.2	3,177.5	4495.1	0.0	4,394.7	0.0	5,024.1	5,024.3	1144.0	204.2	29,482.8
Ccrk #1	3940	1,524.1	1,474.6	4,404.4	2,959.7	3548.4	0.0	3,612.5	5,953.2	4,161.7	4,806.0	825.2	213.6	33,483.4
Ccrk #2	8129	1,488.0	1,635.6	3,834.0	3,645.9	4810.7	420.3	5,179.8	9,619.7	4,909.8	3,566.7	1550.3	308.4	40,969.2
Cyote	4478	1,836.0	1,533.7	3,556.6	2,524.1	4735.3	0.0	4,280.7	8,642.7	3,911.6	4,953.4	1130.9	223.6	37,328.6
Hskt #2	6544	0.0	1,498.8	2,722.6	3,321.2	3937.7	848.7	4,229.8	8,961.9	0.0	4,770.1	0.0	0.0	30,290.8
Lolds #1	8130	1,534.3	1,557.0	3,984.7	3,562.7	4894.1	520.9	5,181.6	9,670.5	4,982.2	3,698.4	1626.4	271.4	41,484.2
Lolds #2	8124	1,448.7	1,272.4	3,743.6	2,714.7	4569.0	289.9	4,959.9	10,039.3	4,437.2	3,569.6	1444.4	334.2	38,822.9
Mry #1	5215	1,545.5	1,586.2	2,636.1	2,538.7	3787.2	0.4	3,418.4	7,983.0	5,880.9	5,315.1	881.7	199.3	35,772.5
Mry #2	5230	1,066.5	1,203.4	3,631.0	2,639.6	3050.5	0.5	4,175.0	9,101.6	4,664.0	6,172.3	980.7	203.4	36,888.5
GreStn #1e	1159	1,556.6	1,498.8	3,100.5	3,179.4	3764.9	739.0	5,039.8	9,091.7	2,685.6	5,517.5	1330.8	209.7	37,714.3
GreStn #10	3319	1,478.0	1,332.4	2,906.9	2,936.5	4692.8	0.0	4,275.5	0.0	4,394.8	4,974.0	848.4	1,331.2	28,170.5

* The 90th percentile of CEMS hour-by-hour concurrent total source sulfur dioxide emissions is 40,140.6 pounds per hour.

ATTACHMENT

Major themes in EPA's June 25, 2001 letter.

Two years of actual sulfur dioxide emissions data. The preamble to the 1980 PSD regulations, FR Vol. 45, pages 52717 and 52718, indicates that actual emissions should be used to determine PSD increment status, as reiterated by EPA Region 8 during several meetings this year. Clearly, there currently is no guarantee that the actual emissions of some sources in future years will not be greater than year 2000 emissions, since these actual emissions are substantially less than permit-allowed emissions.

Five years of meteorological data. We agree that annual frequencies of highest concentrations at individual receptors can fluctuate due to annual differences in transport meteorology. In our 1999 draft Class I Area Analysis for Milton R. Young Generating Station, we used five years of meteorological data, which is recommended in EPA's Guideline on Air Quality Models (40 CFR Part 51 – Appendix W). This analysis was the first in which we used five years for a Class I area air quality assessment. However, we also used permit-allowed sulfur dioxide emissions for coal-fired electrical generating plants (CFEGPs) and some other sources.

Baseline source sulfur dioxide emissions. By letter dated July 3, 2001, we have invited owners of baseline CFEGPs to provide information they deem pertinent to calculations of 1976-77 baseline emissions. Historically, we used the difference between baseline emissions (a flat rate) and permit-allowable emissions (also a flat rate) for baseline sources as increment-affecting emissions.

Other issue framing factors.

1. When concentrations due to PSD increment-affecting sources exceed a PSD Class I increment, the CAA and state rules allow source owners to demonstrate to Federal Land Managers (FLMs) that cumulative concentrations will not adversely impact Air Quality Related Values (AQRVs) of the Class I area. (See also draft New Source Review Workshop Manual, Chapter E.) Historically, the Department of the Interior established procedures, as published at 47 CFR 30226, for review of such demonstrations. Now, the IWAQM report notes that AQRV assessments "typically address actual current emission rates" from existing sources. Pairing of actual emissions with meteorology is ideally suited to characterize frequencies of doses (magnitude and duration) to which AQRVs in Class I areas are exposed, as described in the Federal Land Manager's Air Quality Related Values (FLAG) Workgroup Phase-I Report, as noted by the IWAQM report (title cited below) and as intended by Congress.

2. Using the CALPUFF model, we have modeled the 90th percentile of year 2000 sulfur dioxide source emissions with five years (90-94) of meteorology; however, results are not final, as we used 1997 oil and gas well production data rather than year 2000 production data. We also will model the 90th percentile of year 2000 emissions with year 2000 meteorology; thus, we can demonstrate whether year 2000 plume transport meteorology is

extreme or typical with respect to the effect on short-term sulfur dioxide concentrations in the Class I areas.

3. The continuous emissions monitoring system (CEMS) data for some sources prior to year 2000, as archived in EPA's Acid Rain web pages, are apparently inflated due to erroneous monitoring of in-stack air volume flows; these data should not be used for assessing ambient air quality impacts unless first corrected.

4. The Department will have to revise its state rules so as to include the CALPUFF model for PSD increment attainment, AQRV impact, and visibility impairment assessments (per North Dakota Administrative Code Article 33-15, chapters 15 and 19). CALPUFF is a time-dependent, variable-trajectory air quality model. The model's sulfur dioxide concentrations at receptors in Class I areas generally are linear with respect to sulfur dioxide emissions input.

Observations.

1. Actual hourly sulfur dioxide emissions of PSD Class I increment-expanding sources and oil/gas production wells are not available. Thus, the sulfur dioxide emissions for these sources – as input data for the CALPUFF model – are flat-rate actual emissions. This circumstance should not consequently negate use of actual hourly sulfur dioxide emissions, since such data are available for all PSD major sources.

2. It may not be necessary to model multiple years of actual hourly CFEGP sulfur dioxide emissions data paired with concurrent hourly transport meteorology. For example, using the highest second-highest meteorological plume transport event from year 2000 and/or years 1990-94, a risk analysis could determine probabilities of greater concentrations via the model's general linear relationship between emissions at a source and concentrations at a receptor. Each CFEGP emissions could be randomly varied, etc., similar to a Monte Carlo technique, using actual hourly emissions data for year 2000; two quarters of year 2001 CEMS data also should be available later this year.

3. Our modeling results can be used to (1) verify substantially different outcomes between a model protocol that uses a flat-rate emissions value for each source, whether permit-allowed emissions or 90th percentile of actual emissions, and a protocol that uses actual hourly emissions and (2) demonstrate that a protocol using flat-rate sulfur dioxide emissions overstates the exposure of AQRVs in PSD Class I areas.

4. When using actual emissions, risks that sources individually or collectively emit at levels that might cause concentrations greater than the short term increments should be constrained. Therefore, options in adjusting permit-allowed emissions should be developed and debated before concluding that use of actual hourly emissions data ". . . is not protective of Class I areas."

5. It seems that an EPA-IWAQM preference for five years of meteorology so as to capture worst-case plume transport meteorology and, thus, the worst-case highest second-highest concentration, is a position tolerating no risk for larger concentrations in Class I areas. This position seems incongruous with the near-zero correlations among source actual emissions, CALPUFF and with the judgements by FLMs. CALPUFF is not a risk assessment model; it does not assess risk of human or ecological exposures for known biological response. FLMs apply judgement in ascertaining degree of impact (as adverse) on AQRVs and have used judgement in setting the visibility impairment thresholds in the FLAG Phase I report.

6. The highest second-highest three-hour concentration in each Class I area is substantially larger than the highest second-highest concentrations for each of the remaining four years (per draft Milton R. Young Station analysis, Appendix D). Similarly, the highest second-highest 24-hour concentration generally is larger. Perhaps the wind fields produced by CALMET which transport the plumes that result in these outlier (highest and) highest second-highest concentrations could be examined as to whether such wind fields are reasonable (per the IWAQM report). Or as an alternative, the year of meteorology among the five that yields the worst-case highest second-highest concentrations should be eliminated for the same or similar reasoning that each year's highest concentration is treated as an outlier.

7. As a practical matter, the number of short-term concentrations that exceed a Class I increment at receptors in a Class I area due to the emissions of increment-affecting sources is immaterial. Emissions reductions so as to reduce the highest second-highest concentration (among all receptors in the area) to an amount less than an increment likely reduces other lesser concentrations exceeding the increment so as to become less than the increment. Furthermore, short-term concentrations exceeding the three-hour increment and the 24-hour increment often are not episodically independent; for example, higher time-averaged concentrations often occur concurrently or during back-to-back time lines within a single, time-continuous meteorological plume transport event. Thus, Class I increment exceedances at receptors in a Class I area may not be discrete violations.